



# NETGEAR®

802.11a/b Dual Band Wireless PC Card  
5 GHz/2.4 GHz **WAB501**



## User's Guide

# Introduction

Congratulations on your purchase of NETGEAR's WAB501 802.11a/b Dual Band Wireless PC Card. With the flexibility to operate at both 5 GHz and 2.4 GHz frequency bands, the WAB501 802.11a/b Wireless PC Card can communicate with other mobile devices enabled for IEEE 802.11a or 802.11b standards-based wireless LAN connectivity. You can use this card in conjunction with either an 802.11b, 802.11a, or an 802.11a+b Wireless Access Point or router, to create a wireless network for sharing broadband cable or DSL Internet access among multiple PCs in and around your home or office—at the amazing speed of 54 Mbps.

## Get Started Now!

The WAB501 802.11a/b Wireless PC Card is easy to install. You need only to complete these five steps, which should take about 10 to 15 minutes:

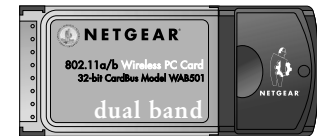
1. Install the WAB501 driver and utility software, page 3
2. Install the WAB501 Wireless PC Card, page 5
3. Verify driver installation, page 5
4. Configure the WAB501 network settings, page 7

## Package Contents

The product package should contain:



WAB501 Resource CD, User's Guide  
Warranty card, and  
Support Information card



WAB501 Dual Band  
Wireless PC Card

- WAB501 802.11a/b Wireless PC Card
- WAB501 Resource CD
- User's Guide
- Warranty card
- Support information card

Please call your reseller or customer support in your area if there are any wrong, missing,

or damaged parts. You should keep the Support information card handy for reference and to locate the telephone number of customer support in your area.

Do not discard the original packaging materials. Although it is uncommon, if the WAB501 802.11a/b Wireless PC Card needs to be returned for repair, the product should be mailed with the original packaging materials.

To qualify for product updates, product support, and product warranty registrations, register online at the NETGEAR web page: <http://www.NETGEAR.com>.

# 1 Installation

## System Requirements

Before installing the WAB501 802.11a/b Wireless PC Card, please make sure that your computer system has the following:

- A computer with a 32-bit CardBus slot.  
Please note that not all notebook or portable computer PC Card slots are CardBus, please check your computer's reference guide for more details.
- Windows® 98/Me/2000/XP (be sure to have the Windows Installation CD-ROM ready for use during installation).
- At least 5 Mbytes disk space for installing the driver and utility programs.

## LED Indicators

The Wireless Link LED on the WAB501 802.11a/b Wireless PC Card indicates the wireless link condition of the station with another wireless node or the associated Access Point.

LED Activity	Meaning of LED Activity
Alternate Blinking	Looking for a network association.
Slow-rate	Associated or joined with the network; no activity.
Fast-rate	Associated or joined with the network; activity on the network.

## Install the WAB501 Driver and Utility Software

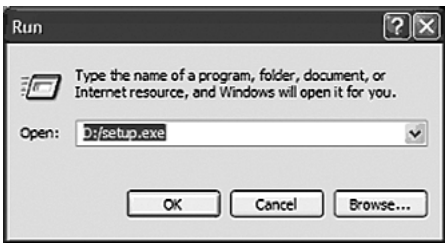
**IMPORTANT NOTE:** You must first install the software before you plug the card into your computer!

Follow these steps to install the WAB501 802.11a/b Wireless PC Card.

1. Turn on your computer.
2. Insert the *WAB501 Resource CD* into the CD-ROM drive.
3. The Autostart Wizard screen will appear, as shown here:



4. Click the Install Driver & Utility option.
5. If the Autorun wizard does not automatically start, go to your Windows Start menu and choose **Run**, and type **D:/Setup.exe** ("D" represents your CD-ROM drive letter), and click **OK**.

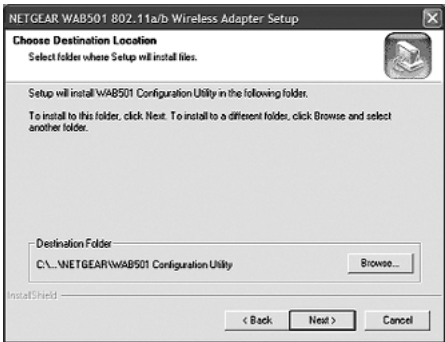


6. The InstallShield Wizard screen will appear.



7. Click **Next** to continue.

8. The Choose Destination Location screen will display the default Destination Folder. If you want to change the default folder, click **Browse** and choose a different destination folder.



9. Then, click **Next** to continue to the next screen.

10. Modify the Program Folders field, if desired. Click **Next** to continue. InstallShield will start copying files onto your system.



11. Click **Finish** to complete installing the Configuration Utility.



## Install the WAB501 Wireless PC Card

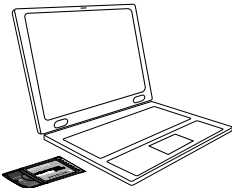
1. With the LED indicators facing up, insert the **WAB501 802.11a/b Wireless PC Card** into the CardBus slot on your computer as shown here.

Windows will automatically detect the WAB501 802.11a/b Wireless PC Card and the Found New Hardware Wizard dialog box will appear.

2. Follow the on-screen instructions to install the driver for the WAB501 802.11a/b Wireless PC Card.

- **For Windows 98/Me users**, once the [Please insert the disk labeled “Windows 98/Me CD-ROM,” and then click **OK**] window appears, enter the path corresponding to the appropriate drives and click OK. Usually these files can be found at **C:\Windows** or **C:\Windows\System**.
- **For Windows 2000 users**, a Digital Signature Not Found message may appear. Click **Yes** to proceed.
- **For Windows XP users**, a Windows Logo Testing Not Found dialog box may appear. Click **Continue Anyway** to proceed.

3. Click **Finish** to complete the installation.



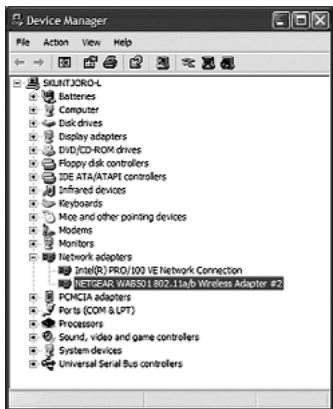
Notebook with  
WAB501 Dual Band  
Wireless PC Card

## Verify Driver Installation

It is a good idea to confirm that the WAB501 802.11a/b Wireless PC Card has been properly installed. Follow the instructions that apply to your computer system:

1. From the Windows desktop, right-click **My Computer**.

- 2. Click **Properties**.
- 3. Open **Device Manager**:  
**Windows 98/Me users** – Select the **Device Manager** folder tab.  
**Windows 2000/XP users** – Select the **Hardware** folder tab, and click on the **Device Manager** button.
- 4. Double-click **Network Adapters**. There should be no yellow exclamation mark or red cross icon on the NETGEAR WAB501 802.11a/b Wireless PC Card selection, as shown here:



- 5. Double-click **NETGEAR WAB501 802.11a/b Wireless PC Card**. On the General folder tab, the **Device Status** window should indicate that the device is working properly, as shown here:




The installation of the Wireless PC Card driver is complete.

# 3 Configuring the WAB501 Wireless PC Card

NETGEAR’s wireless Configuration Utility program will help you learn more about your wireless network, so that you can customize it to better suit your networking needs. The Configuration Utility program will provide information about signal quality and link conditions and let you modify various configurable wireless parameters.

Now that the WAB501 802.11a/b Wireless PC Card has been installed, you can use the **WAB501 802.11a/b Configuration Utility** to view and customize configuration settings and features.

To display the WAB501 Configuration Utility:

- Open the **NETGEAR WAB501 PC Card** programs group or double-click the **WAB501 icon** that appears in the Windows System Tray, as shown here: 
- WAB501 Wireless PC Card SysTray icon

To view or change your configuration settings:

- If you are using Windows 98/Me/2000, turn to page 11.
- If you are using Windows XP, turn to page 8.

## About the WAB501 SysTray Application

The SysTray (System Tray) resides on one end of the taskbar in the Microsoft Windows Desktop. It displays interface icons for memory-resident applications that execute continuously in the background, such as the clock, speaker volume, and virus detection. The wireless Configuration Utility installation for the WAB501 Wireless PC Card will add a configuration and status reporting utility icon in your SysTray.

Once you have completed the utility installation, the Windows SysTray will show the icon in different colors, as described here:

Color	Ad-Hoc Mode	Infrastructure Mode
Red	The Wireless PC Card has not initiated communication with any other wireless node.	Either the Wireless PC Card is not able to link to any Access Point, or the link between the Wireless PC Card and the Access Point is lost.
Yellow	N/A	The link condition between the Wireless PC Card and the associated Access Point is weak.
Green	The Wireless PC Card has communicated successfully with another wireless node.	The Wireless PC Card has established good communication with an Access Point and the signal is strong.

Double-click the Wireless PC Card SysTray icon to activate the wireless Configuration Utility for the WAB501 Wireless PC Card. You can click any of the folder tabs in the NETGEAR WAB501 802.11a/b Configuration Utility dialog box to view the current status or modify operational parameters.

- For detailed information on wireless networking, refer to *Wireless Network Fundamentals*, on page 18.

The WAB501 Configuration Utility contains six sections:

- Status
- Configuration
- Security
- Stations
- Statistics
- About

**Note:** The above sections are always available by clicking on the tab at the top of the Configuration Utility window.

## Configuration Note for Windows XP Users

By default, Windows XP uses its own utility to configure your wireless network settings, however, in order to take advantage of the WAB501 features and functions, we recommend that you use the WAB501 802.11a/b Wireless PC Card Configuration Utility program.

To disable Windows XP configuration utility and use the **WAB501 Configuration Utility**, please follow these steps:

1. After installing the WAB501 Wireless PC Card, Windows XP will display a **Wireless Network Connection #** message, similar to the one shown here:



Click anywhere on the message or on the icon.

2. The Windows XP Wireless Network Configuration window will be displayed and look similar to this:



Click the **Advanced** button.

3. The Wireless Networks Advanced Configuration window will be displayed.



4. Uncheck the option “**Use Windows to configure my wireless network settings.**”
5. Click **OK** to save your changes.

# Status Section

The **Status** section of the NETGEAR WAB501 802.11a/b Configuration Utility dialog box shows the current wireless LAN connection status, statistics of data transmitted and received, signal strength, etc., as shown here.

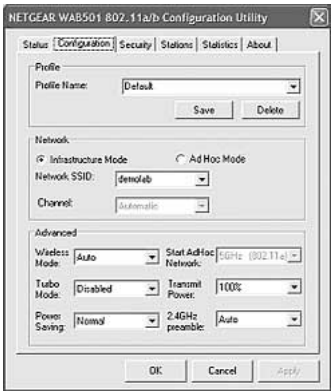


This table describes the information shown in the Status section of the dialog box:

Status	Description
Connected to	Indicates the SSID and MAC address of the associated Access Point when the WAB501 802.11a/b Wireless Adapter is configured in Infrastructure mode.
Network mode	Indicates the network mode of the WAB501 802.11a/b Wireless PC Card (Infrastructure or 802.11 Ad-Hoc).
Channel/frequency	Indicates the wireless channel currently in use.
Transmit Rate	Indicates the data transfer rate between the wireless node and the device to which it is communicating.
Receive Rate	Indicates the data receive rate between the wireless node and the device to which it is communicating.
Encryption	Indicates whether the encryption of this device is enabled (on) or disabled (off).
Data Transmitted/Received	Indicates the number of successfully Transmitted and Received packets.
Signal Strength	Indicates the signal strength of the radio frequency signal received by this wireless node.

# Configuration Section

The **Configuration** section shows you the configuration parameters of the wireless LAN and allows you to modify them.



The Profile area allows you to set values for all parameters by selecting a previously defined profile.

To create a profile, in the Profile Name field, type a **Profile Name** and then set the corresponding Network parameters (SSID, WEP, etc.). When you are done, click the **Save** button in the Profile area, and click **Apply**. If one of the profiles is no longer used, display the name in the Profile Name field, then choose **Delete**. You can add and modify multiple profiles at any time.

This table describes the options available from the Configuration section:

Configuration	Description
Network mode	Configurable between 802.11 Ad-Hoc and Infrastructure modes. In 802.11 Ad-Hoc mode, the wireless nodes form their own local network where the end nodes communicate peer-to-peer without an Access Point. In Infrastructure mode, the wireless searches all available wireless channels to associate with an Access Point.
Network Name (SSID)	Enter a 32-character (maximum) Service Set ID in this field; the characters are case sensitive. When the wireless node is operating in Ad-hoc mode, this field operates as the Basic Service Set ID (BSSID). All wireless nodes in the same network should use the same BSSID.  When in Infrastructure mode, this field defines the Extended Service Set ID (ESSID). The ESSID assigned to the wireless node is required to match the Access Point ESSID in order for them to communicate.
Channel Selection	Specifies a channel only when using an Ad-Hoc network mode. Automatic selection lets you select any unused channel.
Wireless Mode	Specifies 802.11a, 802.11b, or Auto-select operation. Auto-select allows the use of either 802.11a or 802.11b modes.
Start AdHoc Network	Specifies a band to establish an Ad-Hoc network if no matching SSID is found after scanning all available nodes.  You can start the Ad-Hoc network with 5 GHz (802.11a) or 2.4 GHz (802.11b).
Transmit Power	Selects 100%, 50%, 25%, 12%, or Lowest power.
Power Saving	Power management options are Off, Normal, and Maximum. Power management is disabled when Ad-Hoc mode is selected in the Network Connection field. When the Power Saving setting is Off, the adapter receives full power from the PC. When the setting is Normal, the driver turns off power to the adapter for brief periods over briefly-spaced time intervals. When the setting is Maximum, the driver turns off power to the PC Card for longer periods over more widely-spaced time intervals.
2.4 GHz preamble	A long transmit preamble allows the receiver (WAB501 Wireless PC Card) to lock into the received bit patterns more easily. A short transmit preamble provides better performance. Default: Auto (long & short).

## Security Section

To prevent unauthorized wireless stations from accessing data transmitted over the network, the **Security** section of the Configuration Utility offers secure data encryption, known as **WEP**, to better protect your data transmissions.



To activate the WEP Encryption, make sure the **Enable WEP Encryption** box displays a checkmark (as shown above).

WEP Encryption options will be displayed, as shown on the previous page. You may make changes, as detailed here:

1. Select one of the two options: **Create with Passphrase** or **Manual Entry**. A Passphrase makes you easier to enable WEP because it automatically generates the WEP hexadecimal numbers for the key. If the wireless network Access Point uses a Passphrase, you can also use that here. Otherwise, you will have to manually enter the hexadecimal numbers by selecting the **Manual Entry** option.
2. **Create with Passphrase** option: pull down the **Key Length** options and select the 64-bit or 128-bit, then type in your Passphrase.
3. **Manual Entry** option:
  1. Pull down the **Key Length** options and select the **64-bit**, **128-bit**, or **152-bit** encryption method.
  2. In the **Encryption Keys** fields, specify the WEP keys:

*For 64-bit encryption:*

**Hexadecimal: 10 hexadecimal digits** in the range of “A-F”, “a-f” and “0-9” (e.g. 11AA22BB33)



For 128-bit encryption:

**Hexadecimal: 26 hexadecimal digits** in the range of “A-F”, “a-f” and “0-9” (e.g. 00112233445566778899AABBCC).

For 152-bit encryption:

**Hexadecimal: 32 hexadecimal digits** in the range of “A-F”, “a-f” and “0-9” (e.g. 00112233445566778899AABCCDDEEFF).

4. When you are done, click the **Apply** button and click **OK** for the changes to take effect.

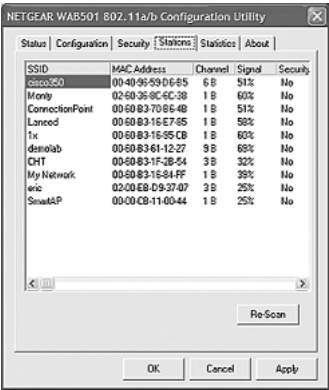
**Important Note:** The WEP keys must be set up exactly the same on all wireless devices in order to communicate with each other.

This table describes the options available from the Security section:

Security	Description
Enable WEP Encryption	Enables the data encryption for the wireless node. If you <b>disable</b> the data encryption (by unchecking the box) then no encryption method will be used; this is also called Open System data encryption. To enable encryption is to use the Shared Key data encryption method.
Create with Passphrase	<p>A Passphrase is use to automatically generate the WEP hexadecimal numbers for the key. If your wireless network Access Point uses a Passphrase, you can use that here.</p> <p>Once you type in the Passphrase, the generated key will be shown before you click <b>OK</b> or <b>Apply</b> button.</p>
Manual Entry	The WEP hexadecimal numbers are needed if a Passphrase is not used in the wireless Access Point but rather if the key is manually entered.
Key Length	<p>The key length must be the same between all wireless nodes and Access Points in the same network. The possible values for the data encryption level are 64-bit, 128-bit, and 152-bit. The 64-bit data encryption is also called 40-bit data encryption by some vendors.</p> <p>Note: The 152-bit encryption mode only applies to the 802.11a mode.</p>
Key1	<p>The WAB501 device uses a selected WEP key to encrypt and decrypt information. When set to 64-bit (also called 40-bit), 128-bit data encryption mode, or 152-bit, you may specify up to four different keys to encrypt wireless data.</p> <p>Select one of the keys as a default key.</p> <p><b>Note:</b> The 152-bit only apply on 802.11a mode.</p>
Key2	
Key3	
Key4	

## Stations Section

The Stations section displays all of the Access Points and the Ad-Hoc Stations that are available.

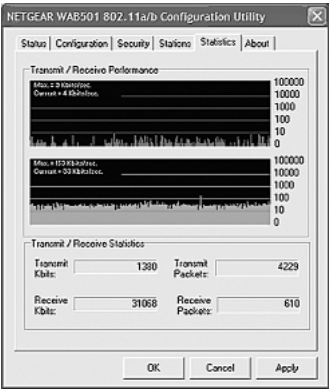


To display Access Points around the working environment, select the **Re-Scan** button. In addition to showing the MAC Address of each Access Point, you can also view the Channel, Signal, Security, and Network Modes.

Click **OK** to continue, or select another tab.

## Statistics Section

The Statistics section of the Configuration Utility dialog box indicates the real-time Transmit and Receive packets performance in graph form and also displays the performance statistics in figures.



Click **OK** to continue or select another tab.

This table describes the options available from the Statistics section:

Statistics	Description
Transmit/Receive Performance	Displays the maximum and current Tx/Rx (Kbits/sec) performance statistics.
Transmit/Receive Statistics	Monitors the Tx/Rx of the Kbits or packet statistics.

## About Section

The **About** section of the Configuration Utility dialog box shows the regulatory domain: FCC for US, ETSI for Europe; the MAC address and the release information of both the device driver for the Wireless PC Card and the Wireless Configuration Utility software.



Click **OK** to continue, or select another tab.

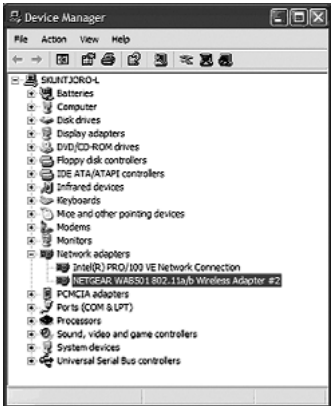
## Adapter Properties (Device Manager) Configuration

**Note:** This section is provided for advanced users, such as System Administrators and Network Administrators.

## Changing Adapter Properties

Earlier in this chapter, instructions have been provided to guide you through using the NETGEAR WAB501 802.11a/b Configuration Utility. However, you may also configure the WAB501 Wireless PC Card using the **Adapter Properties** or **Device Manager** screens, as displayed below.

1. From the Windows desktop, right-click **My Computer**.
2. Click **Properties**.
3. Open **Device Manager**:  
*Windows 98/ME users* – Select the **Device Manager** folder tab.  
*Windows 2000/XP users* – Select the **Hardware** folder tab, and click on the **Device Manager** button.
4. Double-click **Network Adapters**, then double-click **NETGEAR WAB501 802.11a/b Wireless Adapter**, as shown here:



5. Select the Settings folder tab, as shown here:



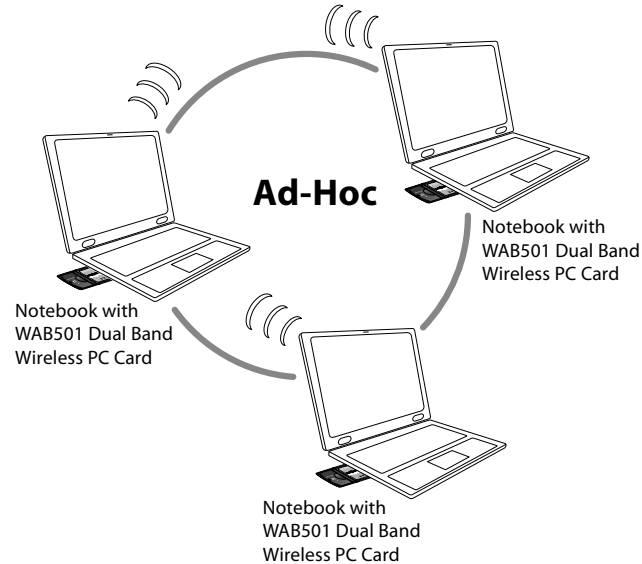
6. Click the **Modify** button to display a number of configurable parameters. Make your selections and click **OK** to save your changes.

# 4 Wireless Network Fundamentals

## Wireless Network Configuration

### Ad-Hoc Mode (Peer-to-Peer Workgroup)

The Institute of Electrical and Electronics Engineers (IEEE) standard for wireless LANs (WLANs), 802.11 offers two methods for configuring a wireless network — Ad-Hoc and infrastructure. In an Ad-Hoc network, computers are brought together as needed; thus, there is no structure or fixed points to the network — each node can generally communicate with any other node. There is no Access Point involved in this configuration. It enables you to quickly set up a small wireless workgroup and allows workgroup members to exchange data or share printers as supported by Microsoft Networking in the various Windows operating systems. Some vendors also refer to ad-hoc networking as peer-to-peer workgroup networking.



In this configuration, network packets are directly sent and received by the intended transmitting and receiving stations. As long as the stations are within range of one another, this is the easiest and least expensive way to set up a wireless network.

To set up an Ad-Hoc workgroup operating with standard protocols, do the following:

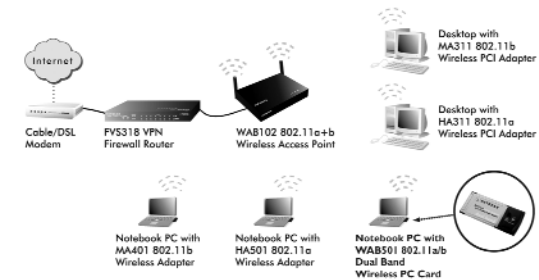
- Set all stations to connect in Ad-Hoc mode (or Peer-to-Peer workgroup mode).

- Set all stations to use the same network name (or SSID).
- Set all stations to use the same wireless channel for communication.
- Set all stations to disable the WEP encryption key, or set all stations to use an identical WEP encryption key.

### Infrastructure Mode

With a wireless Access Point, you can put the wireless LAN into Infrastructure mode. It provides wireless connectivity to multiple wireless network devices within a fixed range or area of coverage, interacting with a wireless node via an antenna.

In the Infrastructure mode, the wireless Access Point converts airwave data into wired Ethernet data, acting as a bridge between the wired LAN and wireless clients. Connecting multiple Access Points via a wired Ethernet backbone can further extend the wireless network coverage. As a mobile computing device moves out of the range of one Access Point, it moves into the range of another. As a result, wireless clients can freely roam from one Access Point domain to another and still maintain seamless network connection.



To set up an Infrastructure network operating with standard protocols, do the following:

- Set all wireless stations to connect in Infrastructure mode.
- Set all stations to use the same network name (or SSID).
- Set all wireless Access Points to use the same network name (or ESSID).
- Set all stations to disable the WEP encryption key, or set all stations to use an identical WEP encryption key as used by the Access Point.
- Set up wireless channels used by individual Access Points. (It is not necessary to set channels on the stations as the stations will automatically scan through all channels for the nearest Access Point.)

Service Set Identification (SSID)

The Service Set Identification (SSID) is a thirty-two alphanumeric character (maximum) string identifying the wireless local area network. Some vendors refer to the SSID as network name. For stations to communicate with each other, all stations must be configured with the same SSID.

A wireless LAN consisting of nodes operating in Ad-Hoc configuration without an Access Point is called a Basic Service Set (BSS). All nodes in a BSS must use the same Basic Service Set ID (BSSID).

In an infrastructure configuration with Access Points, multiple BSS can be configured to form an Extended Service Set (ESS). In this configuration, the Access Points are configured with the same Extended Service Set ID (ESSID). Wireless clients configured with the same ESSID can freely roam from one Access Point domain to another and still maintain seamless connection to the network.

Authentication and WEP Encryption

The absence of a physical connection between nodes makes the wireless links vulnerable to information theft. To provide a certain level of security, IEEE 802.11 standard has defined two types of authentication methods, Open System and Shared Key. Open System authentication is a null algorithm. Shared Key authentication is an algorithm where both the transmitting node and the receiving node share an authentication key to perform a checksum on the original message. By default, IEEE 802.11 wireless devices operate in an open system network.

Wired Equivalent Privacy (WEP) data encryption is utilized when the wireless nodes or access points are configured to operate in Shared Key authentication mode. There are three shared key methods implemented in NETGEAR’s 802.11a/b solutions: the standard based 64-bit WEP data encryption and 128-bit WEP data encryption plus the extended 152-bit WEP data encryption.

The 64-bit WEP data encryption method allows for a five-character (40 bits) input. Additionally, 24 factory-set bits are added to the 40-bit input to generate a 64-bit encryption key. (The 24 factory-set bits are not user configurable.) This encryption key will be used to encrypt/decrypt all data transmitted via the wireless interface. Some vendors may refer to the 64-bit WEP data encryption as 40-bit WEP data encryption since the user configurable key used in the encryption process is only 40 bits wide.

The 128-bit WEP data encryption method consists of 104 configurable bits and the 152-bit WEP data encryption method consists of 128 configurable bits. Similar to the 64-bit WEP data encryption method, the remaining 24 bits are factory set and not user configurable.

Encryption Key Size	# of Hexadecimal Digits	Example of Hexadecimal Key Content
64-bits (24+40)	10	4C72F08AE1
128-bit (24+104)	26	4C72F08AE19D57A3FF6B260037
152-bit (24+128)	32	4C72F08AE19D57A3FF6B26003715DAC2

Wireless Channel Selection

802.11b

IEEE 802.11b wireless nodes communicate with each other using radio frequency signals in the ISM (Industrial, Scientific, and Medical) band between 2.4 GHz and 2.5 GHz. Neighboring channels are 5 MHz apart. However, due to spread spectrum effect of the signals, a node sending signals using a particular channel will utilize frequency spectrum 12.5 MHz above and below the center channel frequency. As a result, two separate wireless networks using neighboring channels (for example, channel 1 and channel 2) in the same general vicinity will interfere with each other. Applying two channels that allow the maximum channel separation will decrease the amount of channel cross talk, and provide a noticeable performance increase over networks with minimal channel separation.

Channel	Center Frequency	Frequency Spread
1	2412 MHz	2399.5 MHz – 2424.5 MHz
2	2417 MHz	2404.5 MHz –2429.5 MHz
3	2422 MHz	2409.5 MHz –2434.5 MHz
4	2427 MHz	2414.5 MHz –2439.5 MHz
5	2432 MHz	2419.5 MHz – 2444.5 MHz
6	2437 MHz	2424.5 MHz –2449.5 MHz
7	2442 MHz	2429.5 MHz –2454.5 MHz
8	2447 MHz	2434.5 MHz – 2459.5 MHz
9	2452 MHz	2439.5 MHz –2464.5 MHz
10	2457 MHz	2444.5 MHz –2469.5 MHz
11	2462 MHz	2449.5 MHz – 2474.5 MHz
12	2467 MHz	2454.5 MHz – 2479.5 MHz
13	2472 MHz	2459.5 MHz – 2484.5 MHz

**Note:** The available channels supported by the wireless products in various countries are different. For example, Channels 1 to 11 are supported in the U.S. and Canada, and Channels 1 to 13 are supported in Europe and Australia.

## 802.11a

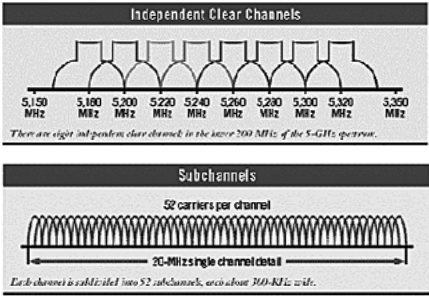
IEEE 802.11a utilizes 300 MHz of bandwidth in the 5 GHz Unlicensed National Information Infrastructure (U-NII) band. Though the lower 200 MHz is physically contiguous, the FCC has divided the total 300 MHz into three distinct domains, each with a different legal maximum power output. Below is a table of summary for different regulatory domains.

U-NII Band	Low	Middle	High
Frequency (GHz)	5.150 – 5.250	5.250 – 5.350	5.725 – 5.825
Max. Power Output	50 mW for US, 200 mW for Canada, Europe, & Australia.	250 mW for US, 200 mW for Europe & Australia, 1 Watt for Canada.	1 Watt for US & Australia, 4 Watts for Canada, 25 mW for Europe.

**Note:** Please check your local Authority for updated information on the available frequency and maximum power output.

The 802.11a uses OFDM to define a total of 8 non-overlapping 20 MHz channels across the 2 lower bands; each of these is divided into 52 subcarriers and each carrier is approximately 300 KHz wide. By comparison, 802.11b uses only 3 non-overlapping channels.

### IEEE 802.11a Channel Allocations



The WAB501 user can use thirteen channels.

Channel	Frequency
36	5.180 GHz
40	5.200 GHz
44	5.220 GHz
48	5.240 GHz
52	5.260 GHz
56	5.280 GHz
60	5.300 GHz
64	5.320 GHz
149	5.745 GHz
153	5.765 GHz
157	5.785 GHz
161	5.805 GHz
165	5.825 GHz

**Note:** The available channels supported by the wireless products in various countries are different.

# Troubleshooting

Problem	Cause	Solution
No lights are lit on the Wireless PC Card.	The wireless card is not inserted into the CardBus slot on your PC properly or the proper WAB501 Wireless PC Card driver is not loaded.	<ul style="list-style-type: none"><li>Remove and reinsert the Wireless PC Card.</li><li>Check the device manager in Windows to see if the adapter card is properly recognized in the Windows operating system. Reload the driver if necessary.</li><li>Try to install the Wireless PC Card in different CardBus slot if it's available.</li></ul>
The two LED's are blinking alternately.	The Wireless PC Card is not associated to any Access Point properly. You may not have configured the wireless parameters of the wireless nodes to be the same as the Access Point.	<ul style="list-style-type: none"><li>The Access Point may not be powered on.</li><li>The Access Point and the WAB501 Wireless PC Card are not configured with the same wireless parameters. Check the SSID, turbo mode option, and WEP encryption settings.</li><li>The Access Point may be out of range. Try moving the system closer to the Access Point or readjusting the antenna on the Access Point. You may also move the Access Point to a higher location for better signal reception by the Wireless PC Card.</li></ul>
I am associated and connected to an Access Point, but I cannot see the other computers on the Ethernet side of the network.	This could be a physical layer problem or a network configuration problem.	<ul style="list-style-type: none"><li>Check to make sure that the Access Point is physically connected to the Ethernet network.</li><li>Make sure that the IP addresses and the Windows networking parameters are all configured correctly.</li></ul>

# General Specifications

Model	WAB501 802.11a/b Wireless Adapter		
802.11b Radio Data Rate	1, 2, 5.5, & 11 Mbps (Auto-rate capable)		
802.11b Operating Frequency	2.412 ~ 2.462 GHz (US)                      2.457 ~ 2.462 GHz (Spain) 2.412 ~ 2.484 GHz (Japan)                  2.457 ~ 2.472 GHz (France) 2.412 ~ 2.472 GHz (Europe ETSI)		
802.11b Operating Range*		Outdoor environment	Indoor environment
	@ 11 Mbps	398 ft (120 m)	198 ft (60 m)
	@ 5.5 Mbps	561 ft (170 m)	264 ft (80 m)
	@ 2 Mbps	890 ft (270 m)	430 ft (130 m)
	@ 1 Mbps	1485 ft (450 m)	660 ft (200 m)
802.11b Encryption	64-bit (also called 40-bit), 128-bit WEP data encryption		
802.11a Radio Data Rate	6, 9, 12, 18, 24, 36, 48, 54 Mbps (Auto-rate capable)		
802.11a Operating Frequency	5.150 ~ 5.250 GHz (low band) 5.250 ~ 5.350 GHz (middle band) 5.725 ~ 5.825 GHz (high band)		
802.11a Operating Range*		Outdoor environment	Indoor environment
	@ 54 Mbps	100 ft (30.5 m)	60 ft (18.3 m)
	@ 6 Mbps	1200 ft (366 m)	300 ft (91.4 m)
802.11a Encryption	64-bit (also called 40-bit), 128-bit, 152-bit WEP data encryption		
Bus Interface	32-bit CardBus		
Provided Drivers	Microsoft Windows 98, Me, 2000, XP		
Dimensions	L: 121.2 mm    W: 54 mm    H: 11.4 mm		
Weight	43.4 g (1.6 oz)		
Electromagnetic Compliance	FCC Part 15 Sub Class B and C, CE		
Environmental Specifications	Operating temperature: 0 to 60° C Operating humidity: 5-95%, noncondensing		
Warranty	Limited 3-year warranty		

\* Actual results will vary depending upon operating environment.

# Declaration of Conformity

For the following equipment:

802.11a/b Dual Band Wireless PC Card – WAB501

Marking by these symbols indicates compliance with the Essential Requirements of the R&TTE Directive of the European Union (1999/5/EC). This equipment meets the following conformance standards:

- EN 301 893
- EN 301 489-17
- EN 60950

**This device should NOT be operated in the following European Union countries: Greece and Spain.** The radio spectrum authorities in these countries do not currently allow operation of this radio device in the 5GHz bands.

**Operation of this device in the U.K.** currently requires the end user or installer to contact the U.K. Radiocommunications Agency (phone: 0207 211 0181) to request a **Temporary Use License**. The Temporary Use License requirement will be removed once pending U.K. license exemption legislation is finalized.

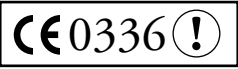
This device is restricted to **indoor use** when operated in the European Union and Switzerland using channels in the 5150-5350 MHz band to reduce the potential for harmful interference to other users of the band.

## For the WAB501

To remain in conformance with European National spectrum usage laws, the following channel limitations apply per the table below. The user should use the utility provided with the product software to check the current channel of operation. If operation is occurring outside of the allowable frequencies as listed in the table, the user should cease operating the product and consult with the local technical support staff responsible for the wireless network.

This device is restricted from operating in Ad-Hoc mode using channels in the 5 GHz bands in the European Union and Switzerland. Ad-Hoc mode is direct communication between two client devices without an Access Point. The user should use the utility provided with the product software to check the current channel of operation.

Allowable Frequencies of Operation	Countries
5150-5250 MHz (Channels 36, 40, 44, 48)	Austria, Germany, Liechtenstein, Switzerland
5150-5350 MHz (Channels 36, 40, 44, 48, 52, 56, 60, 64)	Belgium, Denmark, Finland, France, Iceland, Ireland, Italy, Luxembourg, Netherlands, Norway, Portugal, Sweden, U.K. ( <i>temporary license required for operation in U.K.</i> )



# CE-Konformitätserklärung

Für die folgenden Geräte:

802.11a/b Dual Band Wireless PC Card - WAB501

Produkte mit dem CE-Prüfzeichen entsprechen den wesentlichen Anforderungen der R&TTE-Richtlinie der Europäischen Union (1999/5/EC). Diese Produkte erfüllen somit auch die folgenden Konformitätsstandards:

- EN 301 893
- EN 301 489-17
- EN 60950

**Diese Einrichtung sollte NICHT in den folgenden Ländern der Europäischen Union betrieben werden: Griechenland und Spanien.** Die Funkfrequenzbehörden in diesen Ländern erlauben derzeit nicht den Betrieb dieser Funkeinrichtung in den 5-GHz-Frequenzbändern.

**Betrieb dieses Geräts in Großbritannien:** der Endbenutzer oder Installateur muss von der U.K. Radiocommunications Agency (Tel.: 0207 211 0181) **eine temporäre Nutzungslizenz anfordern**. Diese Anforderung wird aufgehoben, sobald die anhängige britische Gesetzgebung zur Lizenzbefreiung abgeschlossen ist.

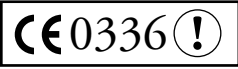
Diese Einrichtung darf nur in **Gebäuden eingesetzt** werden, wenn sie in der Europäischen Union und der Schweiz mit Kanälen im Funkfrequenzband von 5150 bis 5350 MHz betrieben wird, um mögliche schädliche Störstrahlungen für andere Benutzer des Frequenzbands zu verringern.

## Für WAB501

In Übereinstimmung mit den nationalen europäischen Gesetzen zur Spektrumsnutzung gelten die folgenden Kanalbeschränkungen laut Tabelle auf der nächsten Seite. Der Benutzer sollte das in der Produktsoftware enthaltene Hilfsprogramm nutzen, um den aktuellen Betriebskanal zu prüfen. Wenn beim Betrieb Frequenzen außerhalb der zulässigen in der Tabelle aufgelisteten Bereiche auftreten, sollte der Benutzer das Produkt nicht weiter betreiben und sich an einen Mitarbeiter des örtlichen technischen Supports für das Funknetz wenden.

Dieses Gerät darf in der Europäischen Union und in der Schweiz nicht im Ad-Hoc-Modus mit Kanälen in 5-GHz-Funkfrequenzbändern betrieben werden. Der Ad-Hoc-Modus ist die direkte Kommunikation zwischen zwei Clientgeräten ohne Access Point. Der Benutzer sollte das in der Produktsoftware enthaltene Hilfsprogramm nutzen, um den aktuellen Betriebskanal zu prüfen.

Zulässige Betriebsfrequenzen	Länder
5150-5250 MHz (Kanäle 36, 40, 44, 48)	Deutschland, Liechtenstein, Österreich, Schweiz
5150-5350 MHz (Kanäle 36, 40, 44, 48, 52, 56, 60, 64)	Belgien, Dänemark, Großbritannien ( <i>temporäre Lizenz erforderlich für Betrieb in GB</i> ), Finnland, Frankreich, Irland, Island, Italien, Luxemburg, Niederlande, Norwegen, Portugal, Schweden



Hereby, NETGEAR, declares that this Radio LAN device is in compliance with the essential requirements and other relevant provisions of Directive 1999/5/EC.

Valmistaja NETGEAR vakuuttaa täten että Radio LAN device tyypin laite on direktiivin 1999/5/EY oleellisten vaatimusten ja sitä koskevien direktiivin muiden ehtojen mukainen.

Hierbij verklaart NETGEAR dat het toestel Radio LAN device in overeenstemming is met de essentiële eisen en de andere relevante bepalingen van richtlijn 1999/5/EG

Bij deze verklaart NETGEAR dat deze Radio LAN device voldoet aan de essentiële eisen en aan de overige relevante bepalingen van Richtlijn 1999/5/EC.

Par la présente NETGEAR déclare que l'appareil Radio LAN device est conforme aux exigences essentielles et aux autres dispositions pertinentes de la directive 1999/5/CE

Par la présente, NETGEAR déclare que ce Radio LAN device est conforme aux exigences essentielles et aux autres dispositions de la directive 1999/5/CE qui lui sont applicables

Härmed intygar NETGEAR att denna Radio LAN device står i överensstämmelse med de väsentliga egenskapskrav och övriga relevanta bestämmelser som framgår av direktiv 1999/5/EG.

Undertegnede NETGEAR erklærer herved, at følgende udstyr Radio LAN device overholder de væsentlige krav og øvrige relevante krav i direktiv 1999/5/EF

Hiermit erklärt NETGEAR dass sich dieser/diese/dieses Radio LAN device in Übereinstimmung mit den grundlegenden Anforderungen und den anderen relevanten Vorschriften der Richtlinie 1999/5/EG befindet". (BMW i)

Hiermit erklärt NETGEAR die Übereinstimmung des Gerätes Radio LAN device mit den grundlegenden Anforderungen und den anderen relevanten Festlegungen der Richtlinie 1999/5/EG. (Wien)

**ΜΕ ΤΗΝ ΠΑΡΟΥΣΑ NETGEAR ΔΗΛΩΝΕΙ ΟΤΙ Radio LAN device ΣΥΜΜΟΡΦΩΝΕΤΑΙ ΠΡΟΣ ΤΙΣ ΟΥΣΙΩΔΕΙΣ ΑΠΑΙΤΗΣΕΙΣ ΚΑΙ ΤΙΣ ΛΟΙΠΕΣ ΣΧΕΤΙΚΕΣ ΔΙΑΤΑΞΕΙΣ ΤΗΣ ΟΔΗΓΙΑΣ 1999/5/ΕΚ**

Con la presente NETGEAR dichiara che questo Radio LAN device è conforme ai requisiti essenziali ed alle altre disposizioni pertinenti stabilite dalla direttiva 1999/5/CE.

Por medio de la presente NETGEAR declara que el Radio LAN device cumple con los requisitos esenciales y cualesquiera otras disposiciones aplicables o exigibles de la Directiva 1999/5/CE

NETGEAR declara que este Radio LAN device está conforme com os requisitos essenciais e outras disposições da Directiva 1999/5/CE.

**Statement of Conditions**

In the interest of improving internal design, operational function, and/or reliability, NETGEAR reserves the right to make changes to the products described in this document without notice. NETGEAR does not assume any liability that may occur due to the use or application of the product(s) or circuit layout(s) described herein.

**Certificate of the Manufacturer/Importer**

It is hereby certified that the Model WAB501 Wireless Adapter has been suppressed in accordance with the conditions set out in the BMPT- AmtsblVfg 243/1991 and Vfg 46/1992. The operation of some equipment (for example, test transmitters) in accordance with the regulations may, however, be subject to certain restrictions. Please refer to the notes in the operating instructions.

Federal Office for Telecommunications Approvals has been notified of the placing of this equipment on the market and has been granted the right to test the series for compliance with the regulations.

**Federal Communications Commission (FCC) Compliance Notice:**

**Radio Frequency Notice**

NETGEAR, Inc., 4500 Great America Parkway, Santa Clara, CA 95054, (408) 907-8000, declares under our sole responsibility, that this device complies with part 15 of the FCC Rules. Operation is subject to the following two conditions:

This device may not cause harmful interference.

This device must accept any interference received, including interference that may cause undesired operation.

Note: This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures: (1) Reorient or relocate the receiving antenna, (2) Increase the separation between the equipment and receiver, (3) Connect the equipment into an outlet on a circuit different from that to which the receiver is connected, (4) Consult the dealer or an experienced radio/TV technician for help.

**Federal Communications Commission (FCC) Radiation Exposure Statement**

This equipment complies with FCC radiation exposure limits set forth for an uncontrolled environment. In order to avoid the possibility of exceeding the FCC radio frequency exposure limits, human proximity to the antenna shall not be less than 20 cm (8 inches) during normal operation.

**Radio Frequency Interference Requirements**

This device is restricted to indoor use due to its operation in the 5.15 to 5.25 GHz frequency range. FCC requires this product to be used indoors for the frequency range 5.15 to 5.25 GHz to reduce the potential for harmful interference to co-channel Mobile Satellite systems. High power radars are allocated as primary users of the 5.25 to 5.35 GHz and 5.65 to 5.85 GHz bands. These radar stations can cause interference with and /or damage this device.

**Canadian Department of Communications Radio Interference Regulations**

This digital apparatus (Model WAB501 Wireless Adapter) does not exceed the Class B limits for radio-noise emissions from digital apparatus as set out in the Radio Interference Regulations of the Canadian Department of Communications.





# Technical Support

PLEASE REFER TO THE SUPPORT INFORMATION CARD THAT SHIPPED WITH YOUR PRODUCT.

By registering your product at *[www.NETGEAR.com/register](http://www.NETGEAR.com/register)*, we can provide you with faster expert technical support and timely notices of product and software upgrades.

NETGEAR, INC.

## **Support Information**

Phone: 1-888-NETGEAR (For US & Canada only)

See Support Information card for other countries.

E-mail: [support@NETGEAR.com](mailto:support@NETGEAR.com)

[www.NETGEAR.com](http://www.NETGEAR.com)

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February 2003